Claims

8. (Amended) A method comprising the steps of:

a) exposing a predetermined area of a structure with first electromagnetic radiation including at least one predetermined wavelength that is significantly absorbed by water;

b) sensing second electromagnetic radiation from the structure, the second electromagnetic radiation based on the first electromagnetic radiation; and

c) determining whether the water exists in the structure, based on the second radiation sensed in said step (b),

the predetermined area of the structure exposed in said step (a) being at least one square meter.

10. (Amended) A method comprising the steps of:

a) exposing a predetermined area of a structure with the first electromagnetic radiation including at least one predetermined wavelength that is significantly absorbed by water;

b) sensing the second electromagnetic radiation from the structure, the second electromagnetic radiation based on the first electromagnetic radiation;

c) determining whether a water-suspect area exists in the structure, based on the second radiation sensed in said step (b);

d) if said step (c) determines that a water-suspect area exists in the structure, testing the water-suspect area using at least one of a moisture detector, a capacitance meter, an endoscopic probe, and a resistivity meter; and

e) determining whether water is present in the structure, based on the testing of said step (d).

11. (Amended) A method as claimed in claim 10, further comprising the step of:

f) if water is present in the water-suspect area, determining the source of the water.

12. (Amended) A method comprising the steps of:

a) exposing a predetermined area of a structure to electromagnetic radiation including at least one predetermined exposure wavelength significantly absorbed by water, and at least one predetermined reference wavelength that is not significantly absorbed by water;

b) sensing electromagnetic radiation from the exposed predetermined area of the structure at a predetermined detection wavelength that is sensitive to the exposure wavelength if water is present in the exposed predetermined area of the structure, and that is not sensitive to the exposure wavelength if water is not present in the exposed predetermined area of the structure, and at the reference wavelength;

c) determining whether the exposed predetermined area of the structure includes a water-suspect area, based on the electromagnetic radiation sensed in said step (b) at the detection and reference wavelengths;

d) if said step (c) determines that a water-suspect area exists in the structure, testing the water-suspect area using at least one of a moisture detector, a capacitance meter, an endoscopic probe, and a resistivity meter; and

e) determining whether water is present in the structure, based on the testing of said step (d).

13. A method as claimed in claim 12, wherein the detection wavelength is the same wavelength as the exposure wavelength.

16. A method as claimed in claim 12, further comprising the step of:

f) if water is present in the water-suspect area, determining the source of the water.

17. A method as claimed in claim 12, wherein the predetermined area of the structure exposed in said step (a) is at least one square meter.

18. A method comprising the steps of:

a) generating electromagnetic radiation including at least one predetermined exposure wavelength that is significantly absorbed by water and is not significantly absorbed by material composing the structure, and at least one predetermined reference wavelength that is not significantly absorbed by water and the material composing the structure;

b) exposing a predetermined area of the structure with the generated electromagnetic radiation;

c) sensing at least a portion of the generated radiation from the exposed area of the structure to determine a first intensity level of the radiation at the exposure wavelength, and a second intensity level at the reference wavelength;

d) comparing the first and second intensity levels;

e) determining that the water-suspect area includes water if the first and second levels differ by at least a predetermined amount; and

f) determining that the water-suspect area includes no water if the first and second levels do not differ by at least the predetermined amount.

19. A method as claimed in claim 18, wherein said steps (a) and (b) are performed with an electromagnetic radiation generator, and wherein said steps (c) and (d) are performed with a sensor unit, the method further comprising the steps of:

before the performance of said steps (a) - (f),

g) positioning the generator to expose the predetermined area of the structure with the radiation; and

h) positioning the sensor unit to receive and sense the generated electromagnetic radiation from the predetermined area of the structure.

20. A method as claimed in claim 19, wherein the generator and the sensor unit are positioned in said steps (g) and (h) so that the sensor unit receives the portion of the generated radiation by reflection of the radiation from the source from the predetermined area of the structure exposed in said step (a).

21. A method as claimed in claim 19, wherein the sensor unit and the generator are positioned in said steps (g) and (h) so that the sensor unit receives the portion of the generated radiation from the generator after the radiation is transmitted from the generator through the structure to the sensor unit.

22. A method as claimed in claim 18, wherein the radiation used to expose the structure in said step (a) is produced by an electromagnetic radiation generator.

23. A method as claimed in claim 22, wherein the generator includes a quartz halogen lamp.

24. A method as claimed in claim 22, wherein the generator produces the radiation used to expose the structure with a power of between ten (10) and one-thousand (1,000) Watts.

25. A method as claimed in claim 22, wherein the generator is supported in a fixed position during the performance of said step (b) with a photographic stand.

26. A method as claimed in claim 18, wherein the portion of the radiation is sensed in said step (c) with a sensor unit.

27. A method as claimed in claim 26, wherein the sensor unit includes a spectrometer.

28. A method as claimed in claim 26, wherein the sensor unit includes a spectroradiometer.

29. A method as claimed in claim 26, wherein the sensor unit includes a hyperspectral imaging system.

30. A method as claimed in claim 18, wherein the exposure wavelength includes at least one wavelength at about 0.76, 0.97, 1.19, 1.45, 1.94, 2.55, 2.7, 5.5 and 10.7 microns, such wavelengths significantly absorbed by water.

31. A method as claimed in claim 18, wherein the reference wavelength includes at least one wavelength at about 1.06 and 1.66 manometers, such wavelengths not significantly absorbed by water.

32. A method as claimed in claim 18, wherein said step (f) determines that a water-suspect area exists in the structure, the method further comprising the step of-

g) testing to confirm that the water-suspect area of the structure includes water.

34 A method as claimed in claim 32, wherein said step (g) is performed with a moisture meter.

35 A method as claimed in claim 32, wherein said step (g) is performed with a capacitance meter.

36 A method as claimed in claim 32, wherein said step (g) is performed with a resistivity meter and conductive pins coupled to the resistivity meter, the conductive pins inserted into the structure in the water-suspect area thereof to perform step (g).

37. A method as claimed in claim 32, wherein said step (g) is performed with an endoscopic probe.

39. A method as claimed in claim 32, wherein said step (g) includes the substeps of:

g1) scanning the water-suspect area with a capacitance meter; and

g2) determining whether the water-suspect area includes water, based on the substep (gl).

40. A method as claimed in claim 32, wherein said step (g) includes the substeps of:

gl) positioning an endoscopic probe in the structure in proximity to the water-suspect area; and

g2) viewing the water-suspect area with the endoscopic probe; and

g3) determining whether the water-suspect area includes water, based on the substep (g2).

41. A method as claimed in claim 32, wherein said step (g) includes the substeps of:

gl) inserting conductive pins in the structure in proximity to the water-suspect area of the structure;

g2) applying a signal to one of the pins;

g3) sensing the signal level at least one other pin; and

g4) determining whether the water-suspect area of the structure is due to the presence of water, based on the detected signal level.

42. A method as claimed in claim 32, wherein said step (g) determines the presence of water in the water-suspect area so that the water-suspect-predetermined area is a water-confirmed area, the method further comprising the step of:

h) determining the source of water in the water-confirmed area.

43. A method as claimed in claim 42, wherein said step (h) includes the substeps of:

hl) sensing pH of the water;

h2) determining the source of the water to be rain if the pH detected in the substep (hl) indicates that the water is relatively acidic; and

h3) determining that the source of the water is not rain if the pH detected in the substep (hl) indicates that the water is not relatively acidic.

44. A method as claimed in claim 42, wherein said step (h) includes the substeps of:

hl) sensing the salinity of water of the water-confirmed area;

h2) determining that the water-confirmed area is due to water rising from the ground into the structure if the water is relatively saline; and

h3) determining that the water-confirmed area is not due to water rising from the ground into the structure if the water is not relatively saline.

45. A method as claimed in claim 42, wherein said step (h) includes the substeps of:

hl) exposing the water-confirmed area to electromagnetic radiation including at least one exposure wavelength that is significantly absorbed by at least one water-soluble substance and that is not significantly absorbed by material composing the structure, and at least one reference wavelength not significantly absorbed by the water-soluble substance and the material composing the structure;

h2) sensing exposed radiation from the water-confirmed area of the structure at the exposure wavelength absorbed by the water-soluble substance to determine a first intensity level at the exposure wavelength absorbed by the water-soluble substance, and a second intensity level at the reference wavelength;

h3) comparing the first and second levels;

h4) determining whether the first and second levels differ by at least a predetermined amount; and

h5) determining the source of the water to be ground water if the substep (h4) indicates that the first and second levels differ by the predetermined amount.

46. A method as claimed in claim 45, wherein the water-soluble substance includes at least one of gypsum, anhydrite, apatite, halite, sylvite, calcite, magnesite, magnesium-iron solid solution, siderite, rhodocrosite, smithsonite, dolomite, and kutnahorite.

47. A method as claimed in claim 45, wherein the exposure wavelength that is significantly absorbed by the water-soluble substance includes at least one wavelength of about 6.6, 8.7, 9.6, 11.5, and 14 microns.

48. A method as claimed in claim 45, wherein the reference wavelength that is not significantly absorbed by the water-soluble substance is in a range from 7.5 to 8.0 microns.

49. A method as claimed in claim 42, wherein the step (h) includes the substeps of:

hl) determining purity of water of the water-suspect area;

h2) determining the source of the water in the water-suspect area to be condensation if the water is relatively pure; and

h3) determining the source of the water in the water-suspect area not to be condensation if the water is not relatively pure.

50. A method as claimed in claim 18, wherein the exposure wavelength and the reference wavelength of the radiation used to expose the structure in said step (b) are in a range from about 10^{-2} to 10^{8} microns.

51. A method as claimed in claim 17, wherein the predetermined area of the structure exposed in said step (b) is at least one square meter.

52. A method as claimed in claim 17, wherein the structure is a house.

53. A method as claimed in claim 17, wherein the structure is a building.